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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/075,804	10/24/2001	Diane M. Landers	DP-301830	8712

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EXAMINER	
GARCIA OTERO, EDUARDO	
ART UNIT	PAPER NUMBER
2123	

DATE MAILED: 05/21/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/075,804	LANDERS ET AL.	
	Examiner	Art Unit	
	Eduardo Garcia-Otero	2123	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *22 October 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-187* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-187* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *9/17/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION: Non-Final (first action on the merits)

Introduction

1. Title is: AUTOMATED HORIZONTALLY STRUCTURED MANUFACTUREING PROCESS DESIGN MODELING
2. First named inventor is: LANDERS
3. Claims 1-187 have been submitted, examined, and rejected. Claims 1, 60, 119, and 153 are independent claims.
4. Priority is claimed to provisional US application 60/276,255 filed 3/14/2001.

Index of Important Prior Art

5. **Freilich** refers to US patent 6,599,125.
6. **Solid Edge V6** refers to Solid Edge User's Guide Version 6, MU28900-ENG, by Unigraphics Solutions ™, copyright 1998, pages 28, 29, 33, 90, 91, 96, 157, and 178.
7. **Chu** refers to "Operation Planning in NC Programming Based on CAD Systems", by Chi-Hsing Chu et al, 2/22/2002, from Applicant's IDS.
8. **Spence** refers to "Integrated solid modeler based solutions for machining", by A.D. Spence et. al., Computer-Aided Design 32 (2000) 553-568, from Applicant's IDS.
9. **Artificial Intelligence** refers to Artificial Intelligence (Understanding Computers series), by Time-Life Books, 1986, ISBN 0-8094-5675-3, pages 36-43.

Abstract

10. The abstract of the disclosure is objected to because it is more than 150 words. See Specification pages 77-78. Correction is required. See MPEP 608.01(b).

Specification-objections-informalities

11. The Specification is objected to because of the following informalities. Appropriate correction is required.
12. Specification pages 5-6 contain blank spaces for potentially issued patent numbers of patent applications. The first application has issued as US patent 6,735,489. The second has not yet issued.
13. Specification page 19 states "The master process model 20, logically, is a child of the reference set 26 and virtual blank 10". FIG 5 and FIG 8 state "REFERENCE SET OF GEOMETRY". Please discuss and define "reference set 26". Also, the figures do not appear

to display a parent/child association between said reference set 26 and said master process model 20, please clarify. Note the related discussion of the term "horizontal" in the Claim Interpretation section below.

Knowledge based expert systems

14. As a preface to the 35 USC 112 enablement rejections, it appears useful to review three examples of knowledge based expert systems, as well as the relevant cases and burdens.
15. DEFINITION OF EXPERT SYSTEM. The claimed invention appears to be an expert system. See claim 1 "generating machine instructions" and "capturing manufacturing process rules in a spread sheet".
16. An "expert system" is defined by Microsoft Computer Dictionary as "An application program that makes decisions or solves problems in a particular field, such as finance or medicine, by using knowledge and analytical rules defined by experts in the field. It uses two components, a knowledge base and an inference engine, to form conclusions... See also artificial intelligence, inference engine, intelligent database, knowledge base."
17. THREE EXAMPLES. The complexity of early expert systems is discussed by Time-Life Artificial Intelligence (copyright 1986) at page 40 "With considerable help and encouragement from Feigenbaum and his colleague Bruce Buchanan, another Stanford research scientist, Shortliffe devised an expert system dubbed MYCIN. Armed with some 500 if-then rules for diagnosing meningitis and blood infections and recommending antibiotic therapies".
18. A second expert system is discussed at page 41, "CADUCEUS-which was named for the traditional winged-staff-and-serpent symbol of physicians-began in the early 1970s. Its goal is to encompass the essential diagnostic knowledge of some 700 diseases. With Jack Meyers serving as an important source of the system's expertise, it is perhaps unsurprising that CADUCEUS acquired the nickname Jack-in-the-Box.... Systems such as CADUCEUS are severely limited by the size of their knowledge bases."
19. A third expert system is discussed at page 41, "Aldo Cimino... expert in maintaining the complex sterilizers, or "cookers," used for killing bacteria in canned soup... spent about seven months with Michael Smith, a so called knowledge engineer-a computer scientist who tries to reduce complex subjects to the if-then formant that can be processed by an expert

system ... more than 150 rules of thumb to aid the operators of Cambell's sterilizers". Note that two experts spent seven months (or 14 man-months, or more than 1 man-year) to generate 150 if-then rules.

20. LEGAL PRECEDENT. For the record, note two useful cases regarding enablement. *White Consolidated Industries, Inc. v. Vega Servo-Control Inc.* (CAFC) 218 USPQ 961, 963 (7/25/83) addresses software enablement and states "The amount of required experimentation, however, must be reasonable" and "in this case that development of a single pass language translator would require from 1-1/2 to 2 manyears of effort, a clearly unreasonable requirement".
21. Also note that *In re Wands* (CA FC) 8 USPQ2d 1400, 1404 (9/30/1998) provides an 8 factor test for determining undue experimentation: "Factors to be considered in determining whether a disclosure would require undue experimentation...includes (1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims".
22. MPEP BURDENS. Examiner bears "the initial burden to establish a reasonable basis to question the enablement" according to MPEP 2164.04. The burden then shifts to the Applicant to "present persuasive arguments, supported by suitable proofs where necessary", see MPEP § 2164.05. The standard for the Applicant's arguments is "convincing to one skilled in the art", see MPEP § 2164.05.

35 USC § 101-statutory subject matter

23. 35 U.S.C. 101 reads as follows: Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.
24. **Claims 153-187 are rejected under 35 U.S.C. 101** because the claimed invention is directed to non-statutory subject matter. Specifically, the claims are directed towards **"computer data signal".** Said computer data signals appear to be electromagnetic signals (such as voltages containing binary data), and are not statutory subject matter.

25. See MPEP 2105 (VI)(B)(1)(c) which states "Claims that recite nothing but the physical characteristics of a form of energy, such as a frequency, voltage, or the strength of a magnetic field, define energy or magnetism, per se, and as such are nonstatutory natural phenomena. O 'Reilly v. Morse, 56 U.S. (15 How.) 62, 112-14 (1853). However, a signal claim directed to a practical application of electromagnetic energy is statutory regardless of its transitory nature. See O 'Reilly, 56 U.S. at 114-19; In re Breslow, 616 F.2d 516, 519-21, 205 USPQ 221, 225-26 (CCPA 1980).".

35 USC § 112- first paragraph- enablement

26. The following is a quotation of the first paragraph of 35 U.S.C. 112: The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.
27. **Claims 1-187 are rejected under 35 U.S.C. 112, first paragraph,** as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.
28. The claim 1 term **"capturing manufacturing process rules in a spread sheet"** is not enabled. The specification does not adequately enable a knowledge based expert system consisting of manufacturing process rules from machining handbooks and from experience of expert operators.
29. For example, note that Chu page 1 states "all necessary information that drives the NC machine… two main categories – geometric data and technical data. The technical data are generally determined with the aid of machining hand books or according to the **machining experience of operators**; it includes tool selection, arrangement of machining sequences and decision of cutting parameters. After those data have been decided, geometric information such as cutter location data in every tool pass can be obtained… CAD/CAM systems provide the **possibility to generate necessary information of NC programs directly** from the CAD model of a workpiece". Emphasis added.

30. Chu page 20 also states "Data transfer between models and communication of separate NC functions need further investigation" and "it is possible to embed the proposed NC planning functions into the next generation machine tool controller to offer a crucial link between planning and fabrication during rapid-manufacturing by machining. This work provides a systematic description of these function requirement". Note that Chu is dated 2/22/2002, which is after the present applications claimed priority date of 3/14/2001.
31. Thus, even though Chu is later than the present application, Chu still uses words indicating lack of enablement: like "need further investigation" and "next generation machine tool controller" at page 20, and "critical points that remain deficient in using CAD/CAM systems on NC programming... Important tasks are as follows" at page 17.
32. See above discussion of knowledge based expert systems for additional details. Note the difficulty of capturing expert knowledge such as "machining experience of operators".
33. Also in claim 1, the term **"generating machining instructions"** is similarly not enabled.
34. Claims 2-187 are not enabled for the same reasons as claim 1.

35 USC § 112-Second Paragraph-indefinite claims

35. The following is a quotation of the second paragraph of 35 U.S.C. 112: The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
36. **Claims 1-187 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite** for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
37. The claim 1 term **"associative relationship"** is indefinite.
38. Note that said term occurs twice in claim 1, and appears to have different meanings: "said manufacturing feature exhibiting an **associative relationship** with said coordinate system" and "said spread sheet exhibiting another **associative relationship** with said master process model". The first relationship is positional (geometric), but the second relationship is not positional.
39. The claim 2 term **"said associative relationship"** is indefinite. Note that there are distinct associative relationships in parent claim 1, and it is not clear which associative relationship from claim 1 is being further limited in claim 2.

40. Claims 3-187 are indefinite for the same reasons as claim 1.

41. Additionally, in claim 16 and 35, the term **"reference set geometry is defined by dimensional characteristics of a modeled part"** is indefinite. Specification page 19 states "The master process model 20, logically, is a child of the reference set 26 and virtual blank 10". FIG 5 and FIG 8 state "REFERENCE SET OF GEOMETRY". The specification does not adequately discuss or define "reference set 26". Also, the figures do not appear to display a parent/child association between said reference set 26 and said master process model 20, please clarify. Note the related discussion of the term "horizontal" in the Claim Interpretation section below.

Claim Interpretation

42. **The claim language is interpreted in light of the specification.** Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns,* 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

43. In claim 1, the preamble term **"horizontally structured CAD/CAM"** is given little weight, and is not interpreted as a claim limitation. There appear to be at least 2 possible and very different meanings of the term "horizontal".

44. First, regarding modeling the virtual blank, the term "horizontal tree structure" is defined at page 4 as "preferably by establishing an exclusive parent/child relationship between a set of reference planes and each feature". However, features having additional features as children are not expressly excluded. Further, specification page 10 expressly allows features to have children: "certain form features may be preferably dependent from other form features or model elements rather than directly dependent as children from the 3-D coordinate system... For example, and edge blend... the intent being to keep the lineage as short as possible..." If the term "lineage as short as possible" were given weight as a claim limitation, then it would be indefinite. Also, see "additional datum planes" at specification page 10.

45. Second, regarding virtual machining, the specification page 17 states "generating process sheets... add via virtual machining... manufacturing features (12a-12j) to the virtual blank 10 in a horizontally-structured manner". In this context, "horizontally" appears to mean sequentially in time, per specification page 17 that states "snapshot" of "the assembly of the master process model 20 in progress, showing all of the manufacturing features 12a-12j up to

that operation in the assembly, but none that come after it." See above discussion of "associative relationship" in the indefiniteness rejections of claims 1 and 2.

46. In claim 9, the term **"extract"** is interpreted as a "snapshot" of the assembly of the master process model in progress, per specification page 17.

47. Said interpretations are maintained throughout the claims.

Claim Rejections - 35 USC § 103

48. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action: (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

49. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows: Determining the scope and contents of the prior art. Ascertaining the differences between the prior art and the claims at issue. Resolving the level of ordinary skill in the pertinent art. Considering objective evidence present in the application indicating obviousness or nonobviousness.

50. Claims 1-187 are rejected under 35 U.S.C. 103(a) as being unpatentable.

51. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.

52. Independent claim 1 is "method" claim with 9 limitations, numbered by the Examiner for clarity.

53. [1]-**"selecting a blank for machining into an actual part"** is disclosed by Freilich column 8 line 40 "The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes."

54. [7]-**"generating machining instructions to create said actual part by machining said manufacturing feature into said blank"** is Freilich column 8 line 40 "The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes."

55. The additional limitations are not explicitly disclosed by Freilich.

56. [2]-**"establishing a coordinate system"** is disclosed by Solid Edge V6 page 96 "The types of reference planes are base, global, and local...".
57. [3]-**"creating a master process model comprising: a virtual blank corresponding to said blank..."** is disclosed by Freilich column 8 line 40 "The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes." Note that CAD (Computer Aided Design) implies that actual physical structural blank has a virtual counterpart which is used for CAM (Computer Aided Machining).
58. [4]-**"a manufacturing feature"** is disclosed by Solid Edge V6 page 33 "Solid Edge provides protrusion and rib commands to add material, and cutout and hole commands to remove material".
59. [5]-**"virtual machining of said manufacturing feature into said virtual blank"** is disclosed by Solid Edge V6 page 33 "Solid Edge provides protrusion and rib commands to add material, and cutout and hole commands to remove material" and page 28 "complete the model by adding material to (B) or removing material from (C) the previous features". And also implicitly disclosed by Freilich column 8 line 40 "The component is preferably in the form of a block (also known as a blank) for CAD/CAMming purposes" and column 2 line 18 "further modified, for example by cutting, carving".
60. [6]-**"said manufacturing feature exhibiting an associative relationship with said coordinate system"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
61. [8]-**"capturing manufacturing process rules in a spread sheet"** is disclosed by Solid Edge V6 pages 221 "Operation Navigation Tool (ONT)" and page 222-223 for examples of spreadsheets, and Spence FIG 2.
62. [9]-**"said spread sheet exhibiting another associative relationship with said master process model"** is disclosed by Spence at Abstract "developing a comprehensive physical machining process simulation program based on a solid modelling kernel". Note that

Spence's "solid modelling kernel" is equivalent to Freilich's CAD system, and exemplified by Solid Edge V6. Additionally, note that Spence's "physical machining" is equivalent to Freilich's CAM. Thus, Freilich term "CAD/CAMming" is implicitly teaching towards the integration of CAD and CAM, as expressly discussed in Spence.

63. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Solid Edge V6 and Spence to modify Freilich. Starting with Freilich's broad discussion of "CAD/CAMming", one of ordinary skill would have looked to Solid Edge V6 for a standard CAD engine (or "solid modeling kernel" in Spence's terminology) and standard techniques for modeling the construction blanks, and the desired dental devices. Further, one of ordinary skill in the art would have looked to Spence to save time and money by automating the complex and labor intensive physical machining process for the complex curves and complex voids in dental devices. Spence abstract uses the terminology "developing a comprehensive physical machining process based on a sold modeling kernel". Additionally, note that Freilich recognizes and implicitly teaches toward the union and merging of CAD and CAM by using the term "CAD/CAMming".
64. Claims 2-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
65. Claims 2-59 depend from independent "method" claim 1.
66. In claims 2, 4, 6, 8, 12, 23, 24, 25, 26, 27, 31, 43, 45, 46, 51, 52, 53, 54, 56, 57, 58, and 59 **"associative relationship"** is disclosed by Solid Edge V6 page 178 "To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit." Note that one of ordinary skill in the art would interpret Solid Edge broadly as disclosing common types of associative relationships, including parent/child relationships.
67. In claim 3 **"another manufacturing feature exhibiting an associative relationship with said manufacturing feature"** is disclosed by Solid Edge V6 page 178 "To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a

part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit." For example, a hole may be a first manufacturing feature, and internal threads in the hole may be a second associated manufacturing feature. The related CAM actions would be drilling said hole, and cutting said threads.

68. In claim 5, **"virtual blank exhibits an associative relationship with another said manufacturing feature"** is disclosed by Solid Edge V6 page 178 "To fully control one part in relation to other parts in an assembly, you must use a combination of assembly relationships. There is often more than one way to apply relationships that will position a part correctly. It is important to choose the way that best captures design intent, because this makes your assembly easier to understand and edit."
69. In claim 7, **"said virtual blank exhibits an associative relationship with said coordinate system"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
70. In claim 9 and 28, **"creating extracts from said master process model"** is disclosed by Solid Edge V6 page 90 "feature construction process", and also see Applicant's discussion at specification page 17 "In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process" and "snapshot" and "of the assembly of the master process model 20 in progress".
71. In claim 10 and 29, **"extracts comprise replicated models of said master process model at various operations of said manufacturing"** is disclosed by Solid Edge V6 page 90 "feature construction process", and Applicant's admission at specification page 17 "In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process" and "snapshot" and "of the assembly of the master process model 20 in progress".
72. In claim 11 and 30, **"extracts exhibit an associative relationship with said master process model"** is disclosed by Solid Edge V6 page 90 "feature construction process", and also see

Applicant's discussion at specification page 17 "In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process" and "snapshot" and "of the assembly of the master process model 20 in progress".

73. In claim 13 and 32, **"said extracts are used to generate manufacturing process sheets"** is disclosed by Solid Edge V6 page 90 "feature construction process", and also see Applicant's discussion at specification page 17 "In Unigraphics ® software, a Modeling Module includes software configured to handle the extraction process" and "snapshot" and "of the assembly of the master process model 20 in progress". Note that Spence's "solid modelling kernel" is equivalent to Freilich's CAD system, and exemplified by Solid Edge V6. Additionally, note that Spence's "physical machining" is equivalent to Freilich's CAM. Thus, Freilich term "CAD/CAMming" is implicitly teaching towards the integration of CAD and CAM, as expressly discussed in Spence.
74. In claim 14 and 33, **"said virtual blank is positioned and oriented relative to said coordinate system"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
75. In claim 15 and 34, **"said virtual blank is generated as a three dimensional parametric sold model from a reference set of geometry"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
76. In claim 16 and 35, **"reference set geometry is defined by dimensional characteristics of a modeled part"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are

base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".

77. In claim 17 and 36, **"establishing said coordinate system comprises one or more datum planes"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
78. In claim 18 and 37, **"a first datum plane positioned and oriented relative to a reference"** and **"second datum plane positioned and oriented relative to said reference"** and **"third datum plane positioned and oriented relative to said reference"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
79. In claim 19 and 38, **"said first datum plane, said second datum plane, an said third datum plane are orthogonal"** is disclosed by Solid Edge V6 page 29 "Construction and reference elements help you to construct features... Reference elements are planes and axes used to define extents, centerlines, and so forth." and page 96 "The types of reference planes are base, global, and local..." and page 28 "base feature", and page 157 "The first part you place into an assembly is important. It serves as the foundation upon which the rest of the assembly will be built." and page 178 "Capturing Design Intent...".
80. In claims 20 and 39, **"said manufacturing instructions comprise process sheets"** is disclosed by Solid Edge V6 page 90 "feature construction process" and by Spence at Abstract "developing a comprehensive physical machining process simulation program based

on a solid modelling kernel". Note that Spence's "solid modelling kernel" is equivalent to Freilich's CAD system, and exemplified by Solid Edge V6.

81. In claims 21 and 40, **"said process sheets are linked with numerically controlled tools and a coordinate measuring machine"** is disclosed by Spence at Abstract "developing a comprehensive physical machining process simulation program based on a solid modelling kernel" and page 553 "Computer Numerical Control" and Freilich column 8 line 49 "scanning device". Note that Spence's "solid modelling kernel" is equivalent to Freilich's CAD system, and exemplified by Solid Edge V6.
82. In claims 22 and 41, **"said master process model is linked with numerically controlled tools and a coordinate measuring machine"** is disclosed by Spence at Abstract "developing a comprehensive physical machining process simulation program based on a solid modelling kernel" and page 553 "Computer Numerical Control" and Freilich column 8 line 49 "scanning device".
83. In claims 42 and 44, **"modifying a link among a plurality of modeling elements"** is disclosed by Solid Edge V6 page 178 "Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made."
84. In claim 47, **"removing said link among said modeling elements"** is disclosed by Solid Edge V6 page 178 "Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made."
85. In claim 48, **"establishing said link among said modeling elements"** is disclosed by Solid Edge V6 page 178 "Capturing Design Intent... make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made."
86. In claim 49, **"substituting a second plurality of modeling elements for said plurality of modeling elements"** is disclosed by Solid Edge V6 page 178 "Capturing Design Intent...

make minor design modifications and observe how parts in your assembly react. If the assembly does not behave as you expect, you can delete the relationships and reapply them using a different approach... gives you the behavior you want when design modifications are made."

87. In claim 50, 55, **"said extracts are linked with numerically controlled tools and a coordinate measuring device"** is disclosed by Spence at Abstract "developing a comprehensive physical machining process simulation program based on a solid modelling kernel" and page 553 "Computer Numerical Control" and Freilich column 8 line 49 "scanning device".
88. MOTIVATION FOR CLAIMS 2-59. At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to use Solid Edge V6 and Spence to modify Freilich. Starting with Freilich's broad discussion of "CAD/CAMming", one of ordinary skill would have looked to Solid Edge V6 for a standard CAD engine (or "solid modeling kernel" in Spence's terminology) and standard techniques for modeling the construction blanks, and the desired dental devices. Further, one of ordinary skill in the art would have looked to Spence to save time and money by automating the complex and labor intensive physical machining process for the complex curves and complex voids in dental devices. Spence abstract uses the terminology "developing a comprehensive physical machining process based on a sold modeling kernel". Additionally, note that Freilich recognizes and implicitly teaches toward the union and merging of CAD and CAM by using the term "CAD/CAMming".
89. Claims 60-118 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.
90. Claims 60-118 are "manufactured part created by the method" claims, with the same limitations "method" claims 1-59, and thus are rejected for the same reasons as claims 1-59.
91. Note that the prior art discloses the limitations of the "method" claims, and similarly implicitly discloses the "manufactured part created by the method".
92. Additionally, note that claim 1 ("method" according to preamble) and claim 60 ("manufactured part created by the method" according to preamble) appear to have identical

limitations, and differ only by the designation of 35 USC 101 statutory categories stated in their respective preambles.

93. Claims 119-152 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.

94. Claims 119-152 are "storage medium" claims, with the same limitations "method" claims 1-59, and are rejected for the same reasons.

95. Claims 153-187 are rejected under 35 U.S.C. 103(a) as being unpatentable over Freilich in view of Solid Edge V6 and Spence.

96. Claims 153-187 are "computer data signal" claims, with the same limitations "method" claims 1-59, and are rejected for the same reasons.

Conclusion

97. All claims stand rejected.

Communication

98. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eduardo Garcia-Otero whose telephone number is 703-305-0857. The examiner can normally be reached on Tuesday through Friday from 9:00 AM to 8:00 PM. If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kevin Teska, can be reached at (703) 305-9704. The fax phone number for this group is 703-872-9306. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the group receptionist, whose telephone number is (703) 305-3900.

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